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The Long-Term Impact of Educational and Health Spending on Unemployment Rates

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Abstract

This study used panel data regression analysis to evaluate the long-term effects of several measures of U.S. education expenditure on unemployment rates in 50 states and Washington D.C. over 25 years. The data included state-level statistics for fiscal effort, graduation rates, education spending per pupil, gross state product per capita, welfare spending, health spending, political party affiliation, union versus nonunion states, and unemployment rates. Results find that the best way to effectively reduce unemployment is investment in improving the quality of human capital through funding education. Findings specifically conclude that over the long term, investment in human capital through education as defined by per-pupil spending and health services could play a significant role in reducing unemployment rates.

Keywords: *Educational Spending, Health Spending, Unemployment Rate, USA*

JEL Classification: *E24, I18, I28*

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1. Introduction

The impact of education as a vital investment on human capital on the public well-being can be understood from various theoretical viewpoints. Many believe that spending money to support public education is an investment in the public good. The British economist Adam Smith (1776, 767) refers to a linear relationship between education spending and economic growth and argues that government expenditures in infrastructure, safety, security, justice, and education generate benefits not only to a certain group of people but also to the society as a whole. Likewise, Musgrave's concept of merit good suggests that public expenditures such as education spending, welfare, and health spending could generate benefits for the whole society in the long term as positive externalities (Musgrave 1956). Eecke (1998, 145) interprets Musgrave's concept of merit good from the perspective of positive externalities, and sees education as partially a merit good by which all members of a society *"…benefit from a literate and educated population."* In contrast, Friedman (1955, 134) addresses the role of education from the neighborhood effect perspective and asserts that the impact of education spending can be observed and justified by neighborhood effect, indicating that all members of a society can benefit from the outcomes of education spending even if they are not directly involved in education.

Owings and Kaplan (2013, 97-98) look at education from a similar holistic perspective and identify outcomes from which the whole society benefits in the long run. Both Musgrave's concept of merit good and Friedman's concept of neighborhood effect make evaluation and measurement of education's impact more difficult because their approaches have unquantifiable characteristics. Taking a different slant, Rajkumar and Vinaya (2008) see a positive impact of education spending only if there is efficient governance. They refer to several studies that examine whether public spending on human capital always generates positive outcomes. Based on the previous studies and their own study (Rajkumar and Vinaya 2008), they consider better governance as one of the key factors to generate positive outcomes from public spending. In other words, they affirm that public spending in nations that have a very corrupt and ineffective bureaucracy is less likely to have a positive outcome no matter how the resources are allocated and how much is spent.

The chronicle of government's involvement in the American education system illustrates that education is not only considered a primary moral duty but also a legal obligation. This notion is sometimes propelled by internal dynamics and sometimes by external dynamics. Internal dynamics refer to domestic problems such as poor quality schooling, segregation, and schooling inequities.

External dynamics refer to changes that impinge from outside developments. The Soviets' launch of the satellite Sputnik in 1957 would be a good example of external dynamics providing the impetus for the National Defense Education Act (Jolly 2009). Jolly sees the National Defense Education Act (NDEA) prompted by the launch of the Soviet satellite Sputnik as a central example of the American education system's revitalization aimed at building better, more equitable, and excellent education settings for those with high academic potential.

Historically, the need for an educated, highly skilled, and professional labor force has generally been the key driver behind investment in education (Ravitch 1983; Berube 1991; Owings and Kaplan 2013). However, the early American economy did not need to invest considerable funding in human capital because highly skilled and qualified professionals and workers were not in high demand; rather the economy needed an unskilled or semi-skilled work force (Ravitch 1983; Berube 1991; Jackson 1996; Hood 1990; Owings and Kaplan 2013). Thus, investment in education was not priority agenda item for early American presidential administrations, particularly from economic growth perspective.

However, the federal government did not ignore the necessity of education completely. Governmental involvement in education has existed since the American Revolution in the late 1700s. The "sixteenth section" of the Land Ordinance of 1785 is an early evidence of this (Owings and Kaplan 2013). The "sixteenth section" of the Land Ordinance of 1785 allocated federal funding for public schools under the supervision of the new states. The Northwest Ordinance of 1787 was another sign of the federal government's interest in promoting public education. With the decentralization of government during Andrew Jackson's presidency, the government gave the states more authority and responsibility for education. Since that time, the federal government's role in education has expanded beyond supporting education to meet the nation's civic, economic, social, and political needs. Establishing the U.S. Military Academy in 1802, the Naval Academy in 1845, the Coast Guard Academy in 1876, the Merchant Marine Academy in 1936, and United States Air Force Academy in 1954 displayed the federal government's involvement in financing and promoting education *"…to assure its own national security"* and physical survival (Owings and Kaplan 2013, 40).

The World War II was the milestone after which it became clear that the American economy could no longer be carried by an unskilled and semi-skilled work force; rather it was needed advanced technology that required highly educated professionals, scientists, and qualified and highly skilled workers to compete with the outside world (Berube 1991). In addition, following World War

II, thousands of military servicemen were returning to civilian life and looking for employment, threatening to flood the labor market. A policy or act to take care of such a big mass was urgently needed. The GI Bill following World War II directed these young and dynamic individuals to education first by providing educational incentives and benefits, thereby keeping the economy from being overwhelmed by these returning veterans. Even though the initial intention was not to promote education directly, the GI Bill represented a significant investment in human capital as these returning servicemen completed their education and started making considerable contributions to the economy through their knowledge, skills, spending, and taxes. As the need for educated and highly skilled individuals increased, a paradigm shift occurred in the understanding of investment in human capital because of its beneficial outcomes. It took the contemporary concept of human capital 200 years to reach its present maturity (Owings and Kaplan 2013).

2. Literature Review

Most studies on the relationship between education spending and education's outcomes conclude that education spending has a positive impact on the economy (Easterly and Rebelo 1993; Levine and Renelt 1992; Mankiw, Romer, and Weil 1992; Sala-i Martin 1997). Certain studies, however, see little or no significant impact (as cited in Hanushek, [2004]; and in Wolf [2004]). Soares (2003, 703) points out a *"…notion that education is an investment of current resources for future returns which is a notion at the center of the human capital models*." Soares (2003) also observes that funding education is a significant investment from economic growth perspective in terms of employment opportunities in the long run. Marlow (2000, 90) notes the positive impact of funding public education and affirms that *"external benefits may explain why many citizens advocate a strong governmental presence in elementary and secondary education.*" Likewise, Blaug (1985), Psacharopoulos (1996), Barro (1997), Gylfason (2001), and Owings and Kaplan (2013) are among those who look at funding education from an economic outcomes perspective and believe investment in human capital through education has a long-term positive impact on economic growth.

According to the theory of human capital, the more individuals are educated, the higher performance they can achieve in executing the tasks they are assigned (Dimov and Sheppard 2005). Thus, one can assume that the theory of human capital can be considered the major inspiration behind the demand for efficient education since higher quality human capital results in higher performance (Dimov and Sheppard 2005). As higher quality human capital is economics' central concern, the link between education and the economy receives stronger emphasis in the literature (Gylfason 2001; Psacharopoulos 1996; Blaug 1985). This link is

widely considered by developed nations as those economies need higher quality human capital. Research shows that nations with a strong sense of necessity for investment in human capital have better economic growth compared to those who do not have such a strong urge, even though these nations are wealthy and rich in natural resources (Gylfason 2001).

Gylfason (2001) asserts that rapid economic growth requires better education, that in turn, requires more spending and provision. A recent Bureau of Labor Statistics (BLS) report examines unemployment from educational attainment perspective. The report shows that education is one of the key determinants for employment which is a crucial indicator for long term economic growth and prosperity (BLS 2011). One can see that the unemployment rate for young male and female college graduates is about 3 times lower than for those without a high school diploma (BLS 2011). The BLS report (2011) also shows comparisons between those who are enrolled in high school and those who are not, and reports that *"…the unemployment rate for recent high school graduates not enrolled in school was 33.4 percent, compared with 22.8 percent for recent graduates enrolled in college."* The more educated individuals are less likely to be unemployed.

Owings and Kaplan (2013) examine the link between education and employment from a taxable earnings perspective and report that college graduates earn almost 2.5 times more than high school dropouts. In doing so, they pay *"…more tax dollars to support government services"* that would have a direct positive impact on the tax base and the economy (Owings and Kaplan 2013, 98). An analysis conducted by Hanushek (2004) for the Teaching Commission shows that steady improvements in education over a 20-year period could generate as much as a 4 percent increase in Gross Domestic Product. Hanushek (2004) also confirms that quality schooling which yields highly skilled professionals and labor force has a positive impact on GDP.

Much of literature also concludes that it is a challenging task to evaluate the impact and measure the outcomes of money spent because education is a long-term investment that requires commitment and patience to see the outcomes (Ventelou and Xavier 2006; Hanushek and Woessmann 2008; Hanushek 2004). Shindo (2010) studied the impact of educational subsidies on human capital investment that yields economic growth in China. Unlike most previous studies, Shindo (2010) considers longer life cycles to examine the relationship between educational subsidies and economic growth. Hanushek's analysis (2004) affirms that over a long period of time, steady improvements in education without interruption could generate significant increase in Gross Domestic Product.

Ventelou and Xavier (2006) and Hanushek and Woessmann (2008) recommend patience when evaluating the outcomes expected from education investment. It might take years before it is possible to observe the tangible outcomes of education spending.

Some studies stress that the quality of governance is key to getting positive outcomes from public spending (Rajkumar and Vinaya 2008; Devarajan, Swaroop, and Zou 1996; Pritchett 1996; Kaufman, Kraay, and Mastruzzi 2004). These studies note that service delivery, corruption, efficiency, efficacy of spending, political stability, democracy, and rule of law, for example, are factors that determine the quality of the governance. Hanushek and Woessmann (2008, 1) look at the issue from productivity perspective and also emphasize that *"… education can increase the innovative capacity of the economy, and the new knowledge on new technologies, products and processes that promotes growth"*, thus confirming that that investment in human capital through education promotes economic prosperity in the long run. Bazo and Moreno (2008, 1295) point out the indirect effect of investment in human capital through education on economic growth, and claim that a highly educated labor force *"...enables higher returns to be extracted from investment in physical capital*."

Lochner (2010) and Lochner and Moretti (2004) address the impact of education from a socio-economic perspective by looking at the relationship between education and crime. Lochner concludes that many indicators suggest that education reduces crime, stating that *"…an increase in educational attainment significantly reduces subsequent violent and property crime yielding sizable social benefits"* (2010, 1). Owings and Kaplan (2013) reason that educated people are less likely to commit crimes. A crime-free neighborhood is a social benefit often associated with economic growth. Taking a different approach, Gaviria (2002, 245) looks at this relationship between education and crime from an opposite direction and states that *"corruption and crime substantially reduce sales growth."* Gaviria's argument (2002) implies that less corruption and crime significantly increase sales growth, and that has a direct positive impact on economic growth.

Looking at the relationship between education and the economy from a similar socio-economic perspective, Carroll and Erkut (2009, 3) contend that consideration should be given to

> *"…the extent to which increased education results in increases in federal, state, and local tax revenues and in contributions to social support and insurance programs such as Social Security and Medicare reductions in public expenditures on social support and insurance*

programs reductions in public expenditures on incarceration—the costs of building and operating state prisons and county and municipal jails."

Similarly, Glewwe and Hanan (2004, 49) state that a reciprocal relationship exists between education and economic growth. In other words, education spending and economic growth reinforce one another, with investment in education positively stimulating economic growth and economic growth creating higher demand for education.

Defining who the stakeholders are when discussing education funding and its outcomes also deserves consideration. Spring (2002) argues that not only the stakeholders, but also those without children in a school district should support educational investments because all parties benefit from its outcomes, pointing to the benefits such as economic growth, political stability, efficient use of labor, and reduction in crime. By the same token, Hilber and Mayer (2009) stress that residents without children also benefit from investment in human capital through education because of education's positive impact on their property values. Finally, Spring (2002) affirms that if education spending increases the labor force's skills quality and capability, every individual would benefit from the outcomes generated. Therefore, everyone in the community should be considered as stakeholders in education.

Investment in education is also a means to improve public health, which positively impacts the nation's economy. Owings and Kaplan (2013) state that those with higher levels of education are more likely to have health insurance and, therefore, be healthier individuals. Schultz (2003) notes that advancements in a population's child nutrition, adult health, and education are some of the variables that have significant impact on economic growth. Baldacci, Clements, Gupta, and Cui (2008) address this issue from developing countries' perspective and assert that spending in education and health plays a significant role in achieving Millennium Development Goals (MDGs) that are approved by 189 member countries of the United Nations. Among other items in the public overall expenditures, education spending is the one that can be justified by the social rate of return that shows the total value of all benefits received from the spending allocated to a certain area (Gupta, Verhoeven, and Tiongson, 2002). They identify the positive impact of public spending on education and health, and affirm that public spending on education increases the rate of education attainment, and public spending on health care reduces child and infant mortality rates (Gupta, Verhoeven, and Tiongson 2002, 732).

Ventelou and Xavier (2006, 413) address the relationship between the role of education spending and economic growth through the Data Envelopment Analysis

method (DEA), and state that the effect of public spending on economic growth *"… appears decisively higher when envelopment methods are used as a prerequisite for the econometrics."*The Data Envelopment Analysis method distinguishes the sources that are used not only for productive reasons but also for reasons such as altruistic social services and policing. In doing so, one can observe the positive outputs that cannot be observed in short term. Thus, Ventelou and Xavier (2006, 404) go further and point out the hidden benefits generated through public spending, stating that the benefits generated through public spending are generally *"…overlooked at the time of the evaluation."* They conclude that short term inefficiency that is observed when examining the outcomes of public spending should not be misleading because social wellbeing that could potentially be created through public spending in the long run can modify the potential for macroeconomic growth (Ventelou and Xavier 2006).

3. Methodology

A large number of studies have examined whether investment in human capital through education has any significant impact on the fight against unemployment. Some studies see little or no significant impact, while some others show a significant relationship. Thus, the extent of the relationship between investment in human capital through education and unemployment remains elusive, which necessitates thorough research for clarification. The primary purpose of the study was to understand and evaluate the long-term effect of several measures of education expenditures on unemployment rates, while accounting for other variables as well. This study inquired whether there was a significant correlation between education and the economy in terms of the impacts of investment in human capital on unemployment. This research presented an empirical work with qualitative contribution. The study employed panel data analysis to examine the relationship between unemployment and several determining factors in 50 states and Washington D.C. over 25 years. Washington D.C. was treated as a state for the purposes of this study. In this empirical study, existing data sources were used.

The data used in this research were retrieved and collected from official and reliable governmental or non-governmental web sites (for example, U.S. Department of Education, National Center for Education Statistics, U.S. Census Bureau of Labor, the Bureau of Labor Statistics). However, although these are all reliable sources for an academic study, slight variations among these data sources exist. This study sometimes had to take an average value for the same observation in cases when these separate sources provided different averages even if these averages do not significantly digress from one another. This research

constructed a database that consists of a compilation of data from the various sources described above, and presented new tables, figures, and calculations derived from these data. The data included state-level statistics for fiscal effort, graduation rates, education spending per pupil, gross state product per capita, welfare spending, health spending, political party affiliation, union versus nonunion states, and unemployment rates. Panel data regression analysis was used to examine to what extent variations in the dependent variable of interest could be explained by variations in explanatory variables**.**

In addition, several methods are used to better understand the determinants of variation in a given variable, which vary depending on the time span and the number of observations in the sample. Cross sectional data analysis would help the researcher to examine the relationship between dependent and independent variables at only one point in time (Olsen 2004, 7). Time series analysis would help examine changes in one subject over the course of time. Cochrane (1997, 8) defines time series as a *"…set of repeated observations of the same variable."* The panel data analysis used in this research examined the relationship between the variables in fifty states and Washington D.C. over time. Dougherty (2007, 408-409) lists the reasons for increasing interests in panel data sets as follows:

> "*Their use [panel data sets] may offer a solution to the problem of bias caused by unobserved heterogeneity, a common problem in the fitting of models with cross-sectional data sets… it may be possible to exploit panel data sets to reveal dynamics that are difficult to detect with cross-sectional data… [And] they often have very large numbers of observations."*

This study examined not only the relationship between unemployment and education expenditure but also the relationship between unemployment and other explanatory variables such as welfare spending, health spending, income per capita, gross state product, union vs. nonunion states, graduation rates, political party affiliation, etc. This research gradually expounded the differences in results owing to different estimation methods. Initially, this study conducted a pooled OLS regression analysis. In this setting, the relationship between unemployment and a host of explanatory variables can be represented as:

$$Y_{it} = \beta X_{it} + e_{it} \quad (1)$$

where Y_{it} denotes unemployment in state *i* at time *t* and X_{it} denotes a vector of explanatory variables as suggested by the existing literature, and e_{it} denotes the error term. The argument can be made, however, that explanatory variables

affect unemployment after some time has elapsed, i.e. with a time lag, in which case we would add the five-year-lagged values of these variables:

$$Y_{it} = \beta X_{it} + \lambda L5.X_{it} + e_{it} \quad (2)$$

This research, however, uses a panel of employment and various explanatory variables data in 51 cross-sectional units over 25 years. In a panel data framework it is quite likely for state-level unemployment be correlated to state-specific unobserved characteristics, such the attitude of the population to job loss and job search, the general employment environment, etc. The effect of these unobservable characteristics would not be accounted for by the equation above. The result would be an equation that suffers from the omitted variables problem, and the estimates would be biased and unreliable, as they would come to contain an effect for which they are not responsible. The specification that would help account for the unobservable state characteristics would be:

$$Y_{it} = \beta X_{it} + c_i + e_{it} \quad (3)$$

where Y and X denote the same variables as in the first equation, and c_i denotes the state-specific effects. This equation would be estimated by panel OLS. The subsequent issue that regards the estimation method is that of the choice between a fixed-effects and a random-effects estimation. The random-effects estimation required that the state-specific unobservable characteristics, c_i, be uncorrelated to the vector of explanatory variables. This is, admittedly, quite a strong assumption, as it is in fact quite likely for these unobservables, such attitudes and culture, to be related not only to unemployment, but to state expenditure levels in general and education expenditure in particular. If this assumption does not hold, the random effects estimators would be inconsistent. The fixed-effects estimation, however, does not impose such strong assumptions on the data. As such, it becomes the preferred estimator in cases where the state-specific effects are likely to be correlated with the right-side variables, as the author of this study believes is the case. A panel OLS with state fixed effects is econometrically equivalent to a pooled OLS regression with state categorical (dummy) variables, so we could indeed run the same regression described above as a pooled OLS with state dummies, i.e.:

$$Y_{it} = \beta X_{it} + D_i + e_{it} \quad (4)$$

Running a pooled OLS with state dummies has the added advantage of allowing for the addition of time dummies. Indeed, it is quite plausible for unemployment, while structurally different in each state, to vary across years. There could be particular years in which unemployment increases or decreases in all states due to US-level business cycles or countercyclical federal expenditure.

The year effect would then be captured by a year dummy, and the equation above would be amended as:

$$Y_{it} = \beta X_{it} + D_i + D_t + e_{it} \quad (5)$$

where D_t is a vector of categorical variables pertaining to each year t. The last specification would replace the values of explanatory variables from the same year in equation (5) above with five-year-lagged values instead:

$$Y_{it} = \beta X_{it} + \lambda L5.X_{it} + D_i + D_t + e_{it} \quad (6)$$

One could try various specifications of the equation above, such as a specification with three-year lags or ten-year lags added, or even replace the same-year variables for one-year lagged variables.

To review, the purpose of this empirical study was to evaluate the long-term effect of several measures of education expenditure on unemployment rates, while accounting for other variables. This research employed panel data regression analysis to see to what extent these measures of education expenditure have impact on unemployment rates while accounting for other variables as well. The final results were reached gradually through four specifications. In the first specification, OLS regression was employed where state-level unobservable characteristics are not accounted for. In the second specification, the OLS regression with five-year-lags of the explanatory variables was employed one where present level unemployment was regressed on the values of the explanatory variables from five years ago. In the third specification, a regression with state and time level fixed effects was run. And, finally the study employed the regression with five-year lags and state and time fixed-effects, which allowed addressing both reverse causality and state and time unobservable characteristics.

4. Results

To evaluate the correlation between independent and control variables, this study employed four different specifications to find the actual effect of independent variables on the dependent variable. The dependent variable is unemployment. The control variables are: education spending per pupil, state fiscal effort, gross state product per capita, graduation rates, the degree of unionization, political party affiliation, welfare spending, and health spending. In terms of the significance of the results, a confidence level of 95% (significance at the 0.05 level) is generally used in education, athletics, and the social sciences. However, the confidence level of 90 percent could also be acceptable in social science (Djupe and Gilbert 2003).

Table 1. OLS Regression Output

Variables	Coefficients	t-Statistics
Political Party Affiliation	-0.00134	-0.03
Union vs. Non-union	-0.25105***	-2.76
Welfare	1.05551***	9.82
Health	0.20365***	3.42
Graduation Rate	-0.06562***	-8.81
Fiscal Effort	-0.84847	-0.47
GSP Per Capita	-0.00004***	-2.67
Education Spending Per Pupil	0.00024***	4.11
Constant	8.20250***	10.04
R-square	0.262	
Observations	969	

*** p<0.01, ** p<0.05, *p <0.1 (The dependent variable is unemployment)

In the first specification above OLS regression was employed where state-level unobservable characteristics are not accounted for. In this specification, the coefficient of each of the "Union vs. Non-union", "Welfare", "Health Spending", "Graduation Rate", "Gross State Product Per Capita", and "Education Spending Per Pupil" variables are significant at the 0.01 level. The significant and positive coefficient of the constant term means that the unemployment will exist even when we account for all the explanatory variables. In this specification R-square value indicates that twenty-six percent of the variance in unemployment can be predicted from the control variables.

Table 2. OLS Regression with Five-Year-Lags of the Explanatory Variables

Variables	Coefficients	t-Statistics
Political Party Affiliation	0.07543	1.48
Union vs. Non-union	0.01814	0.17
Welfare	0.11433	0.93
Health	0.59255***	7.63
Graduation Rate	-0.04451***	-5.01
Fiscal Effort	8.17485***	3.62
GSP Per Capita	0.00014***	7.22
Education Spending Per Pupil	-0.00010	-1.23
Constant	0.63831	0.62
R-square	0.333	
Observations	714	

*** p<0.01, ** p<0.05, *p <0.1 (The dependent variable is unemployment)

In the second specification above the OLS regression with five-year-lags of the explanatory variables is employed one where present level unemployment is regressed on the values of the explanatory variables from five years ago. “Health Spending”, Graduation Rate”, “Gross State Product Per Capita”, and “Fiscal Effort” are the only variables that show significant correlations in terms of their effects on unemployment. In this specification it indicates that thirty-three percent of the variance in unemployment can be predicted from the control variables.

Table 3. Regression with State and Time Level Fixed Effects

Variables	**Coefficients**	**t-Statistics**
Political Party Affiliation	-0.80092***	-7.52
Union vs. Non-union	1.47652***	7.79
Welfare	0.71109***	8.21
Health	0.16502**	2.54
Graduation Rate	-0.00032	-0.03
Fiscal Effort	1.13386	1.10
GSP Per Capita	-0.00004***	-3.33
Education Spending Per Pupil	-0.00025***	-5.52
Constant	7.03658***	5.96
R-square	0.838	
Observations	969	

*** p<0.01, ** p<0.05, *p <0.1 (The dependent variable is unemployment)

In the third specification above a regression with state and time level fixed effects was employed. In this specification, the coefficient of each of the “Political Party Affiliation”, “Union vs. Non-union”, “Welfare”, “Gross State Product Per Capita”, and “Education Spending Per Pupil” variables is significant the 0.01 level. The coefficient of “Health Spending” variable is significant at the 0.05 level. As seen in the first specification as well, the significant and positive coefficient of the constant term in this specification means that the unemployment will exist even when we account for all the explanatory variables. In this specification the R-square value indicates that almost eighty-four percent of the variance in unemployment can be predicted from the control variables.

The fourth specification is the regression with five-year lags and state and time fixed-effects, which allows addressing both reverse causality and state and time unobservable characteristics. In this fourth specification, the coefficient of each of the “Union vs. Nonunion”, “Fiscal Effort”, and “Education Spending per Pupil” variables is significant at the 0.01 level. The coefficient of “Gross State Product Per Capita” variable is significant at the 0.05 level. Finally, the coefficient

of “Health Spending” is significant at the 0.10 level. As seen in the first and third specifications as well, the significant and positive coefficient of the constant term in this fourth specification means that the unemployment will exist even when we account for all the explanatory variables. In this specification the R-square value shows that eighty-three percent of the variance in unemployment can be predicted from the control variables. In the findings summary section there are further details explained to better understand the meanings of the results obtained in this section.

Table 4. Regression with Five-Year Lags and State and Time Fixed-Effects

Variables	**Coefficients**	**t-Statistics**
Political Party Affiliation	0.17713	1.34
Union vs. Non-union	1.52661***	6.80
Welfare	0.10974	0.88
Health	-0.17583*	-1.88
Graduation Rate	-0.00563	-0.42
Fiscal Effort	4.47025***	2.67
GSP Per Capita	0.00005**	2.07
Education Spending Per Pupil	-0.00024***	-2.67
Constant	5.15451***	2.79
R-square	0.830	
Observations	714	

*** p<0.01, ** p<0.05, *p <0.1 (The dependent variable is unemployment)

When OLS regression is employed (where state-level unobservable characteristics are not accounted for), the degree of unionization, graduation rate, and state income level have a negative effect on the level of unemployment. However, welfare and health spending are positively correlated with the unemployment level, but in this case the causation is likely to run in the opposite direction; i.e. as unemployment increases, so do welfare spending and health spending. Quite surprisingly, education spending per pupil, too, is positively correlated with unemployment, and this could also be explained by the reverse causality described above, as it is likely that states feel pressed to increase spending per pupil as unemployment increases. What should help reduce concerns about reverse causality discussed above is the OLS specification with five-year-lags of the explanatory variables, i.e. one where present level unemployment is regressed on the values of the explanatory variables from five years ago. In this specification the only variable that has a negative effect on unemployment is high school graduation rate.

These results make sense with the fact that the US economy has gradually become a knowledge-intensive one, and in such an economy the only factor that helps reduce unemployment in the long run is graduation rates, which demonstrates the significance of investment in human capital through education. The literature also confirmed that those who have a high school diploma get a job faster and pay more tax dollars since they earn more than those without a high school diploma (Owings and Kaplan 2013; Bureau of Labor Statistics 2011). When a regression with state and time level fixed effects is run, the variables that have a negative effect on unemployment are income per capita in a state, spending per pupil, and the degree of republican leaning in a state. As far as the other variables are concerned, the negative effect of graduation rate becomes insignificant, which means that it is likely picked up by the state fixed effects. In other words, in the first specification the effect that can be attributable to the state unobservables was picked by other variables such as the graduation rate. Once we account for state level unobservables the significance of the other variables disappears. This would imply that once state-level unobservable characteristics are taken into account, graduation rate does not have an unemployment-reducing effect. Furthermore, the negative effect of the degree in unionization becomes positive, suggesting a similar pattern. However, it is still likely for the differences in explanatory variables, such as per capita income, to be affected by, or codetermined with the differences in the dependent variable. This makes it difficult to make strong statements about the direction of the causality between the dependent and the explanatory variables.

The last and the most complete specification is the regression with five-year lags and state and time fixed-effects, which allows addressing both reverse causality and state and time unobservable characteristics. In this specification, the only variables that have a negative effect on unemployment are per pupil spending and health spending. This indicates that, in the long term, the only way to effectively reduce unemployment is investment in improving the quality of human capital through spending in education and health. It is conceivable for a healthier and better educated workforce to be more flexible and resilient when economic downturns occur. Acquiring new skills or actively seeking to relocate one's job is made easier by better education and health, mental and physical.

Additionally, the effect of unionization is positive, which is in line with existing economic research that indicates that stronger unions contribute to a more rigid labor market. Employers would not be eager to hire new employees due to rigid union states' employment policies. The effect of fiscal effort is quite puzzling, as it is also positive. However, due to the relative nature of this variable, variation could quite likely be caused by changes in the denominator, i.e. income,

so it is difficult to provide a satisfactory explanation for its effect. While some states show greater devotion to fund education by their higher rates of exerting fiscal effort, their actual spending per pupil could be relatively lower than some other states. Statistics would not appreciate the devotion; rather, it would account for the actual amount spent for education when dealing with the correlations. The positive effect of gross state product, on the other hand, could be attributable to business cycles. The higher income increases above trend, the more likely it is for the economy to be on the upswing of the business cycle, hence, the more likely it is for unemployment to increase five years later, as the business cycle goes into a downturn. The negative correlation between income and unemployment in the simultaneous specifications (I and II) corroborates this explanation. Given the variance in results depending on the specification, it is worth elaborating on the differences between the latter and selecting the one that is most satisfactory from a methodological point of view. While the regressions with fixed effects account for unobservable traits related to states or time periods, regressions with five-year lags help address the issue of causality between the dependent and the explanatory variables. It is the view of this study that the issues of causality and that of unobservable traits have to be addressed simultaneously; hence the choice of the regressions with five-year lags and state and year level fixed effects.

5. Discussion

This empirical study employed panel data regression analysis to examine to what extent variations in the dependent variable of interest could be explained by variations in explanatory variables. The study included a sample of America's 50 states and Washington D.C. The data used in this empirical study included gross state product per capita, education spending per pupil, fiscal effort, graduation rates, the degree of unionization, political party affiliation of each state, welfare spending, and health spending. As previously mentioned, a large body of literature addresses the significance of the investment in human capital from various perspectives. This study confirmed that investment in human capital through education and health services plays a significant role in the economy. More specifically, this study showed that investment in human capital through education and health services could play a significant role in reducing unemployment rates. Finally, the panel data analysis employed in this study confirmed that one could be ninety-nine percent confident that the relationship between per pupil spending and unemployment is not accidental. When state-level unobservable characteristics and the issue of reverse causality are taken into account the regression with five-year lags and state and time fixed-effects also

confirmed that the relationship between health spending and unemployment is not accidental with ninety percent confidence.

This study did have several limitations. It did not include all variables that could have an impact on unemployment. In other words, this study could benefit from some additional variables to strengthen the generalizability of the results. For example, this research could benefit from the inclusion of the education level of the states as a variable in addition to the high school graduation rate that was already included as a variable in the study. Racial and ethnic characteristics of the states could also be included as an explanatory variable to strengthen the reliability of this research.

Several studies refer to the connection between education and crime, and indicate that the highly educated individuals would receive higher income, pay more taxes, and be less likely to commit a crime and be incarcerated (Carroll and Atkins 2009; Lochner 2010; Owings and Kaplan 2013; Lochner and Moretti 2004; Gaviria 2002). An entrepreneur would definitely consider a crime-free region when making investment decisions. A region that attracts more investment would likely suffer less from unemployment. The characteristics of labor force by state would also be another variable that could be used in this research. As the U.S. economy gradually becomes a knowledge-intensive economy the characteristics of labor force gain much more significance in employers' decision making processes. The states where the majority of the labor force is constituted of unskilled and lowly educated individuals are more likely to suffer from unemployment than those who have transformed to a knowledge-based economy. In this research a 25-year period was covered. However, this study could benefit from a further extended period to strengthen the validity.

Finally, the 2007-2008 economic recession might weaken the validity of the results since current economic indicators are severely affected by the recession. One can see that unemployment rates in the United States were relatively stable until the Great Recession. As the Great Recession hit the economy, the unemployment rates increased sharply, and affected other economic indicators as well. The impact of the Great Recession created so many outliers that might threat the validity of the research results. Although this study showed that most of the explanatory variables used in this research play a significant role in explaining variations in the dependent variable, the study could have introduced other explanatory variables to produce more generalizable and reliable results. Thus, future research could consider including variables such as state-level education levels, racial and ethnic composition, crime rates, and the characteristics of the labor force as new explanatory variables to achieve better

results. A research that covers a longer period of time would also be an issue that could be addressed in the future.

6. Conclusions

This research sought to evaluate the long-term effect of several measures of education expenditure on unemployment rates, while accounting for other variables such as gross state product per capita, graduation rates, the degree of unionization, political party affiliation, welfare spending, and health spending. One can be ninety-nine percent confident that investment in human capital through education and health has an unemployment-reducing effect. The purpose of this study was to evaluate whether there was any significant impact of investment in human capital through education on economy particularly in terms of employment issues. Of the four separate specifications in this research, the final and most complete specification showed that investment in human capital through education and health spending have positive economic outcomes. More specifically, the variables that negatively affect unemployment are education spending per pupil and health spending. The final and most complete estimation method with the regression with five-year lags and state and time fixed-effects showed that the states with higher per pupil spending and health spending have lower unemployment rates. This result showed that the best way to effectively reduce unemployment is investment in improving the quality of human capital through funding education and better health services.

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